

FCC Test Report

Report No.: AGC10706210101FE04

FCC ID : 2AWXK-ACD01
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Wireless Charger Stand
BRAND NAME : ABKO
MODEL NAME : ACD01
APPLICANT : ABKO CO., LTD
DATE OF ISSUE : Feb. 23, 2021
STANDARD(S) : FCC Part 15 Rules
TEST PROCEDURE(S)
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Feb. 23, 2021	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	ABKO CO., LTD
Address	M Signature 7th floor, 20, Magokjungang 1-ro, Gang seo-gu, Seoul, Republic of Korea
Manufacturer	ABKO CO., LTD
Address	M Signature 7th floor, 20, Magokjungang 1-ro, Gang seo-gu, Seoul, Republic of Korea
Factory	ABKO CO., LTD
Address	M Signature 7th floor, 20, Magokjungang 1-ro, Gang seo-gu, Seoul, Republic of Korea
Product Designation	Wireless Charger Stand
Brand Name	ABKO
Test Model	ACD01
Sample ID Number	210107074
Date of test	Jan. 09, 2021 to Feb. 23, 2021
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2020) and the energy emitted by the sample EUT tested as described in this report is in compliance with Section 15.207, 15.209, 15.203 of the FCC Part 15, Subpart C Rules.

The results of testing in this report apply to the product/system which was tested only.

Prepared By

Sky Dong

Sky Dong
(Project Engineer)

Feb. 23, 2021

Reviewed By

Max Zhang

Max Zhang
(Reviewer)

Feb. 23, 2021

Approved By

Forrest Lei

Forrest Lei
(Authorized Officer)

Feb. 23, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	110KHz-205KHz
Test Frequency	133kHz
Maximum field strength	52.80dBuV/m(PK)@3m
Modulation	FSK
Number of channels	1
Antenna Designation	Coil Antenna (Met 15.203 Antenna requirement)
Hardware Version	V70
Software Version	IP6806_AA2_HL01_TDFNJ
Power Supply(Input)	DC 5V2A; DC 9V1.8A
Wireless Charging Output power	5W /7.5W /10W

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Wireless charging Mode(Full load)-10W
2	Wireless charging Mode(Half load) -10W
3	Wireless charging Mode(Null load) -10W
4	Wireless charging Mode(Full load) -7.5W
5	Wireless charging Mode(Half load) -7.5W
6	Wireless charging Mode(Null load) -7.5W
7	Wireless charging Mode(Full load) -5W
8	Wireless charging Mode(Half load) -5W
9	Wireless charging Mode(Null load) -5W

Note:

1. The mode 1 was the worst case and only the data of the worst case record in this report.
2. The antenna 1 and antenna 2 can't work at the same time and each antenna has been tested. The antenna 1 is the worst case and recorded in the report.

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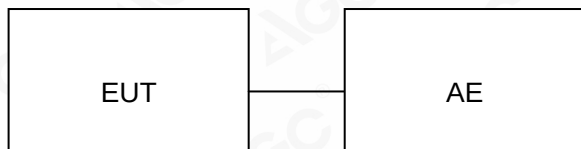
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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure :



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Wireless Charger Stand	ACD01	N/A	EUT
2	Adapter	TPA-46050100VU	N/A	AE
3	Wireless Load	N/A	10W	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.209	Radiated Emission	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Jun. 08, 2020	Jun. 07, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Jan. 09, 2019	Jan. 08, 2021
Test software	FARA	EZ_EMC (Ver.RA-03A)	N/A	N/A	N/A

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7. RADIATED EMISSION

7.1 TEST LIMIT

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	
Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m (2) The smaller limit shall apply at the cross point between two frequency bands. (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.			

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7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

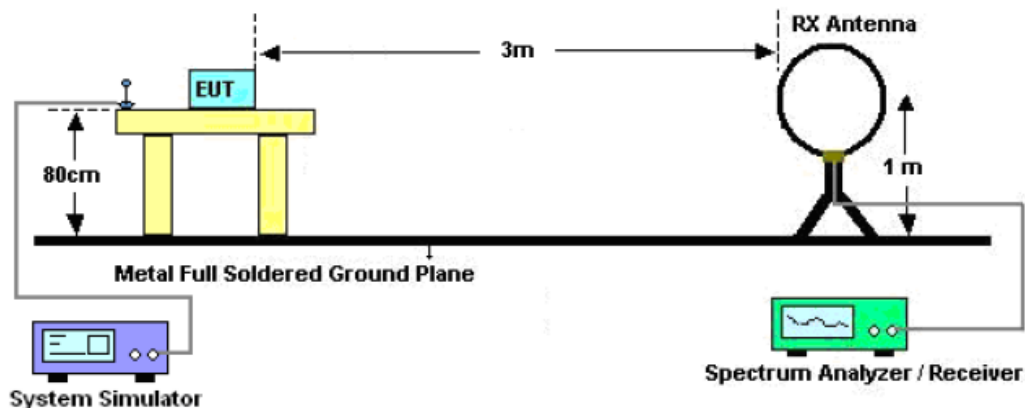
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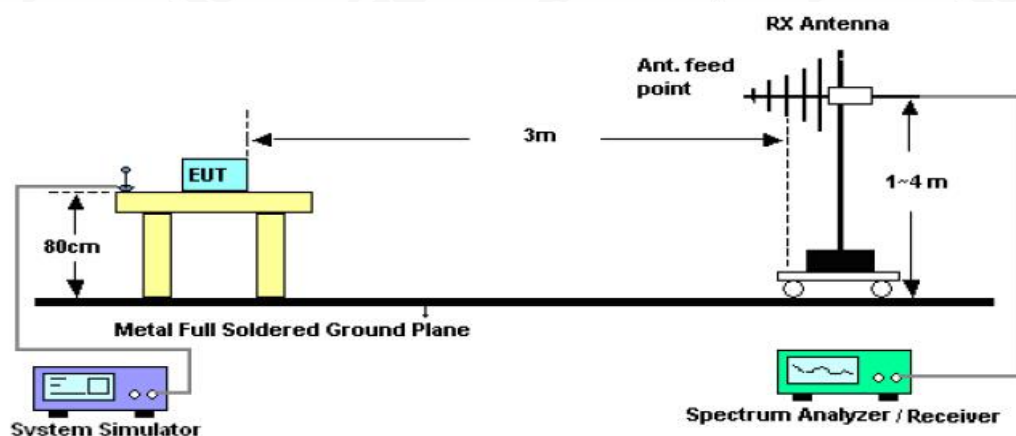


7.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

Frequency MHz	Polarization	Reading dB(uV) PK	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail
0.133	Face	42.38	10.43	52.81	105.13	-52.32	Pass
0.133	Side	33.93	10.43	44.36	105.13	-60.77	Pass

Note1: The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported. The peak level of the emission is less than the average limit, so the average level shall be less than the limit without test.

Note 2: $\text{Level(dBuV/m)} = \text{Reading(dBuV)} + \text{Factor(dB/m)}$

$\text{Factor(dB/m)} = \text{Antenna Factor(dB/m)} + \text{Cable loss(dB)} + \text{Attenuation(dB) for Attenuator}$

$\text{Margin} = \text{Level} - \text{Limit}$

For 0.133MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 105.13\text{dBuV/m.}$

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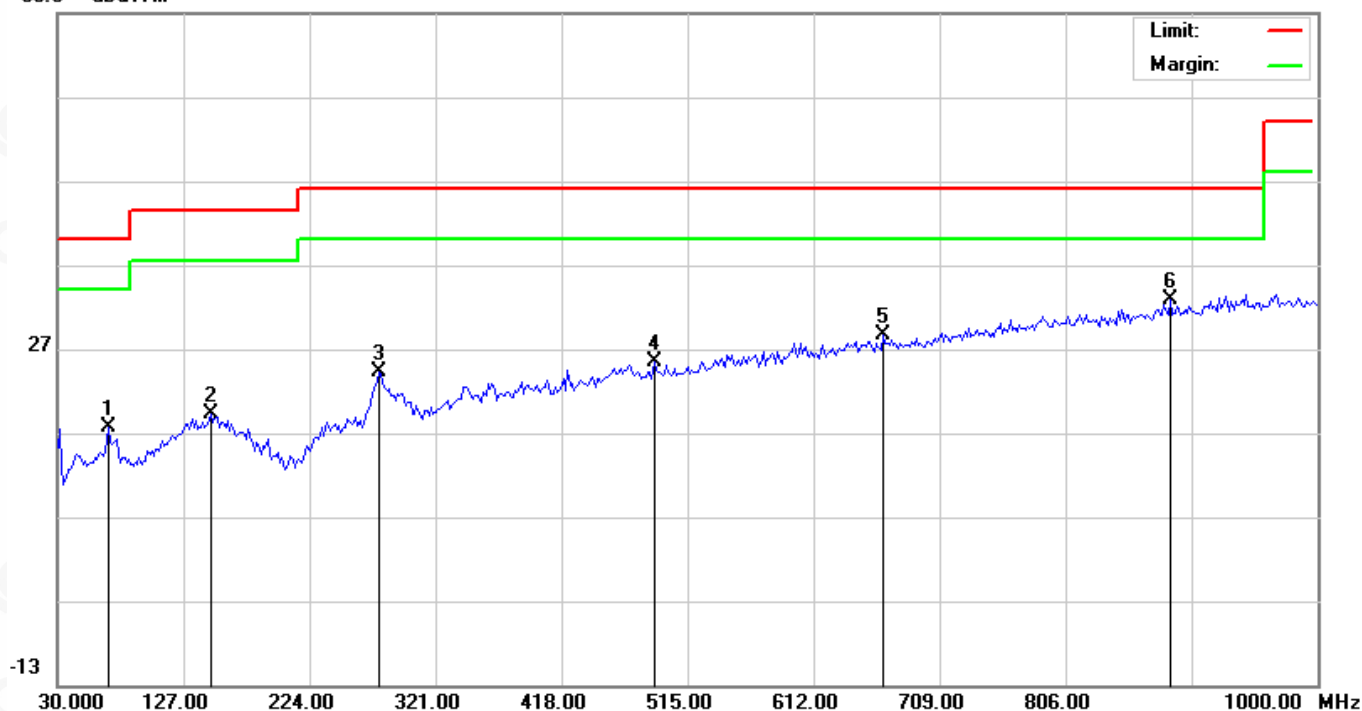
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RADIATED EMISSION 30MHz- 1GHz

EUT :	Wireless Charger Stand	Model Name. :	ACD01
Temperature :	21.8°C	Relative Humidity:	58%
Pressure :	1010 hPa	Test Voltage :	DC9V
Test Mode :	Mode 1	Polarization :	Horizontal

66.9 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		68.8000	0.61	16.96	17.57	40.00	-22.43	peak
2		148.0167	-0.09	19.21	19.12	43.50	-24.38	peak
3		277.3500	4.42	19.72	24.14	46.00	-21.86	peak
4		489.1333	0.60	24.77	25.37	46.00	-20.63	peak
5		665.3500	0.84	27.73	28.57	46.00	-17.43	peak
6	*	886.8333	1.29	31.53	32.82	46.00	-13.18	peak

RESULT: PASS

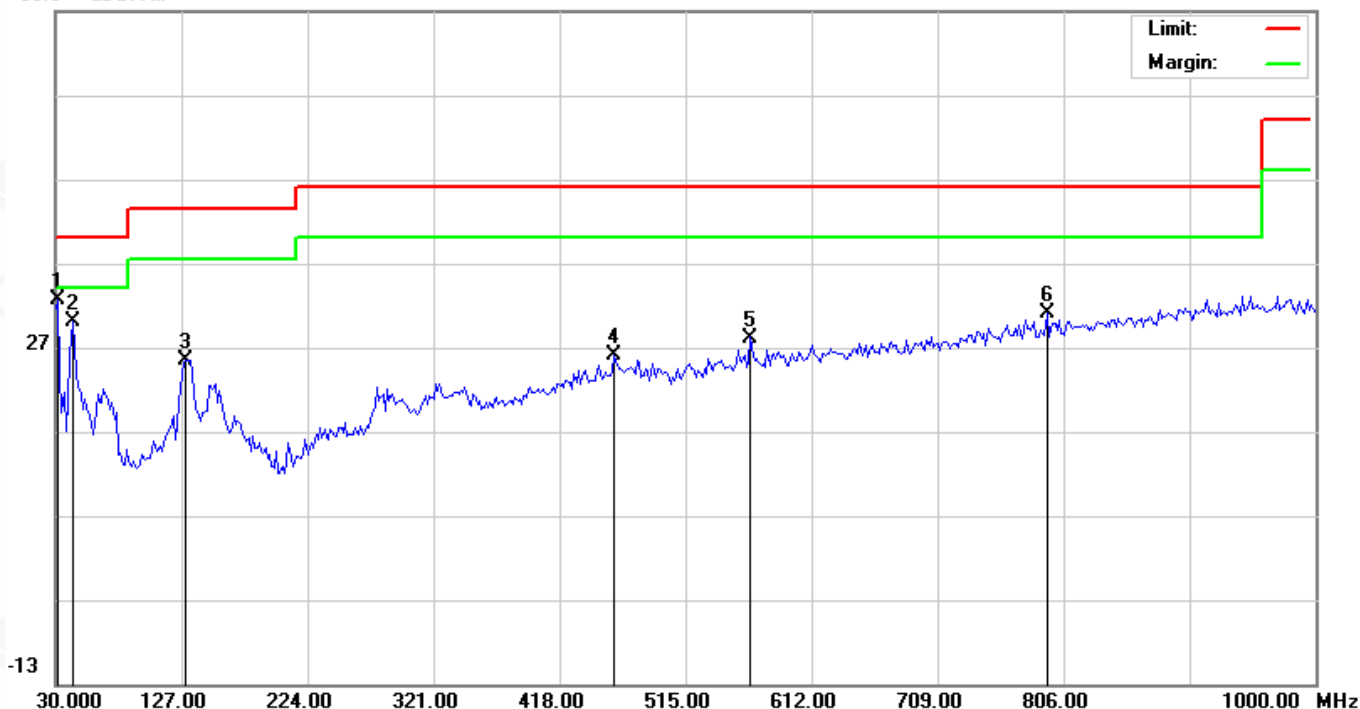
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EUT :	Wireless Charger Stand	Model Name. :	ACD01
Temperature :	21.8℃	Relative Humidity :	58%
Pressure :	1010 hPa	Test Voltage :	DC9V
Test Mode :	Mode 1	Polarization :	Vertical

66.9 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	31.6167	20.34	12.22	32.56	40.00	-7.44	peak
2		42.9333	15.29	14.69	29.98	40.00	-10.02	peak
3		130.2332	6.88	18.61	25.49	43.50	-18.01	peak
4		460.0333	1.72	24.19	25.91	46.00	-20.09	peak
5		565.1167	1.83	26.27	28.10	46.00	-17.90	peak
6		793.0667	0.74	30.25	30.99	46.00	-15.01	peak

RESULT: PASS
Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

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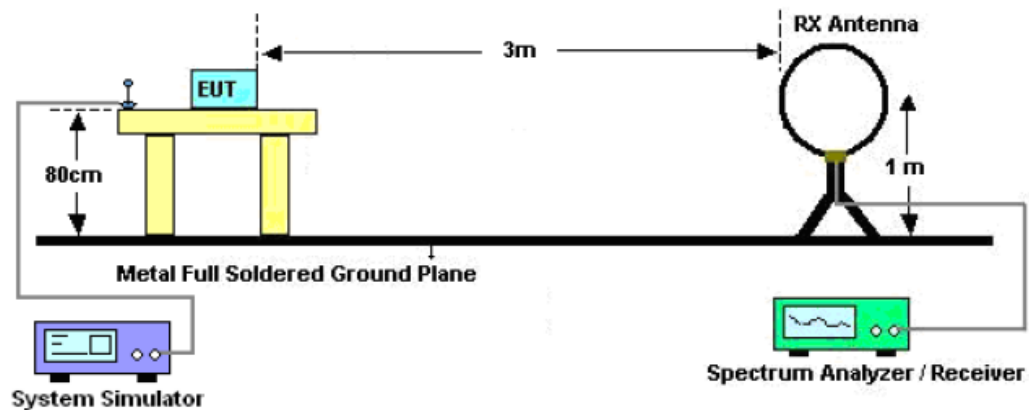


8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Set the EUT Work on operation frequency.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a channel
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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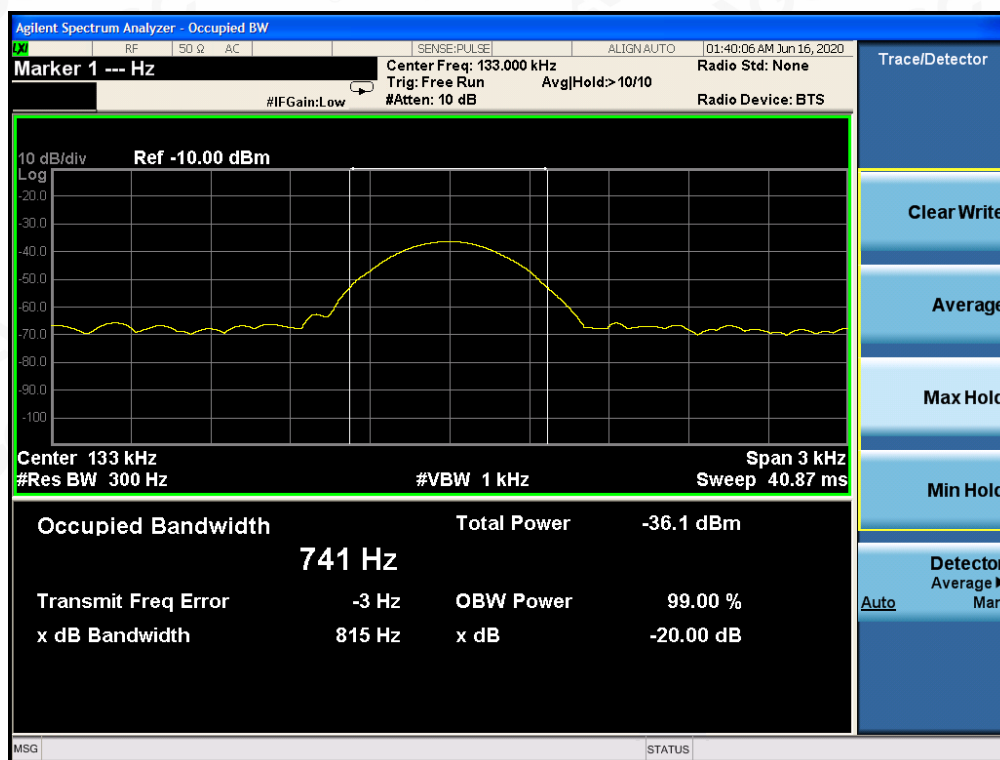


8.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	FSK

Test Data (Hz)		Criteria
Operate Channel	815	PASS

TEST PLOT OF BANDWIDTH



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9. FCC LINE CONDUCTED EMISSION TEST

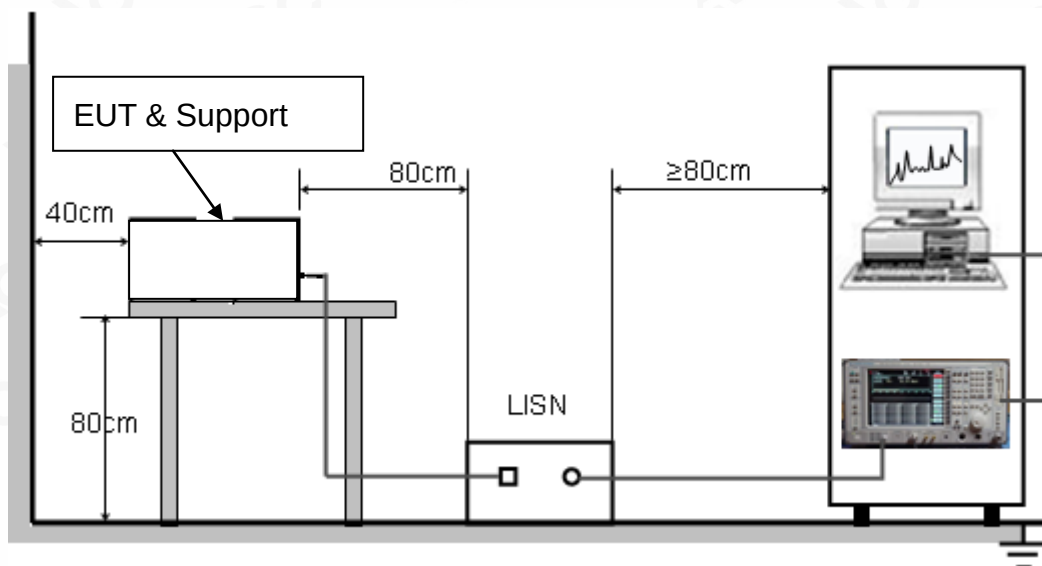
9.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

9.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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9.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

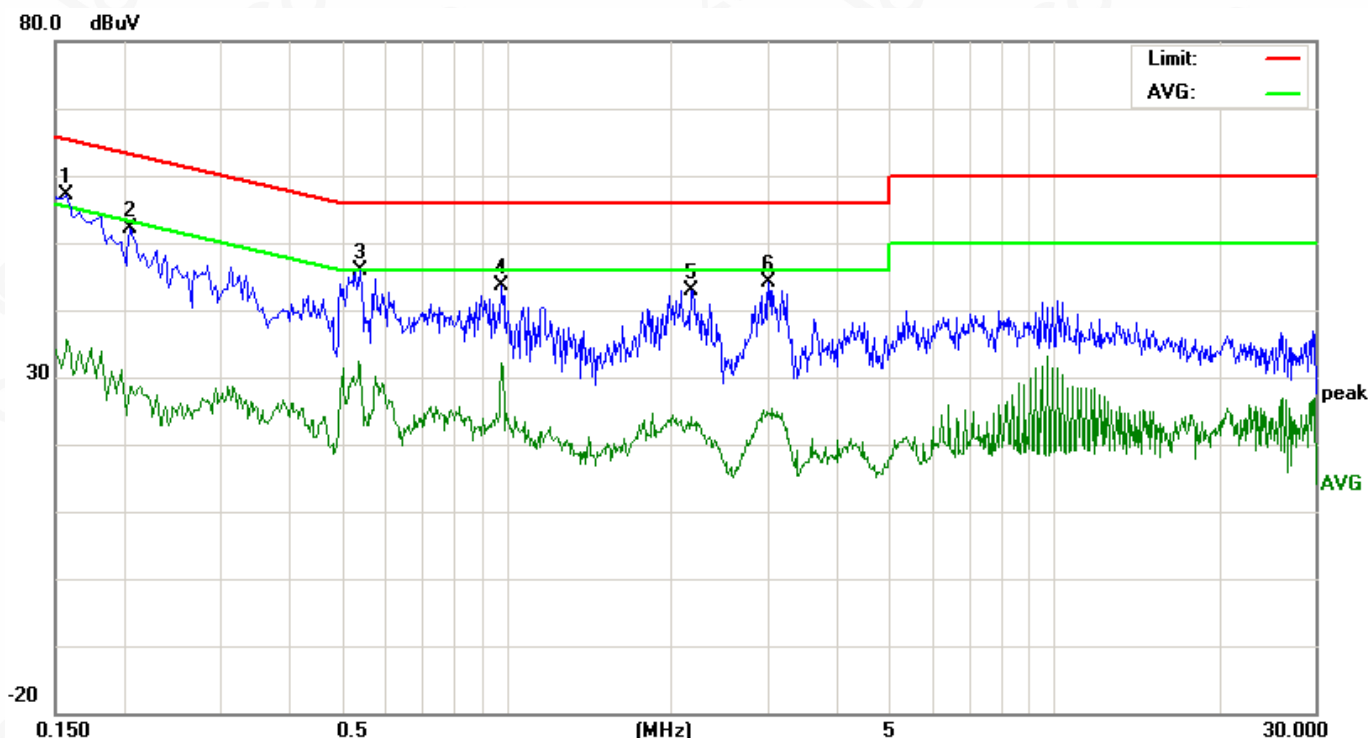
9.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.



9.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG	
1	0.1580	44.31	37.92	19.27	12.79	57.10	50.71	32.06	65.56	55.56	-14.85	-23.50	P
2	0.2060	39.35	31.32	13.02	12.87	52.22	44.19	25.89	63.36	53.36	-19.17	-27.47	P
3	0.5420	32.19	28.36	17.63	13.77	45.96	42.13	31.40	56.00	46.00	-13.87	-14.60	P
4	0.9820	29.72	24.86	18.25	13.81	43.53	38.67	32.06	56.00	46.00	-17.33	-13.94	P
5	2.1780	29.34	19.88	8.74	13.61	42.95	33.49	22.35	56.00	46.00	-22.51	-23.65	P
6	3.0220	30.97	22.10	10.56	13.27	44.24	35.37	23.83	56.00	46.00	-20.63	-22.17	P

RESULT: PASS

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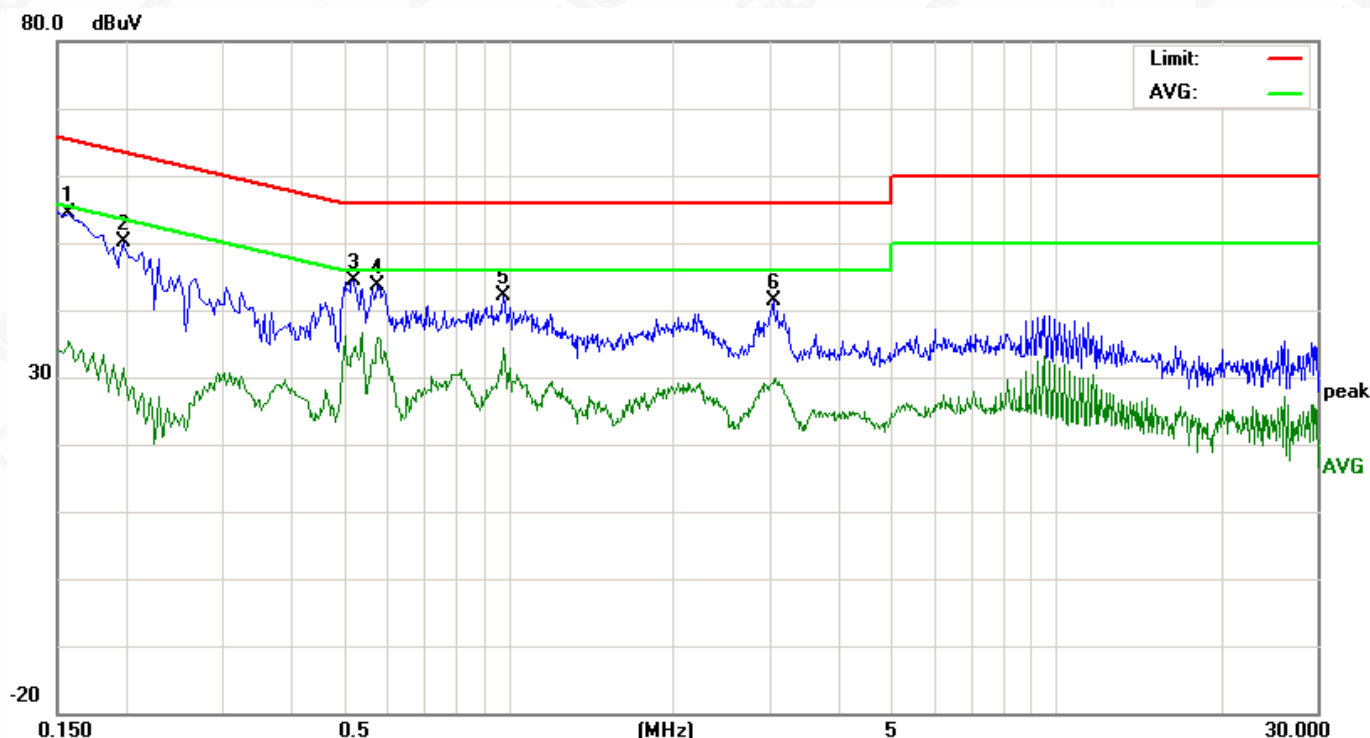
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LINE CONDUCTED EMISSION TEST-N



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG	
1	0.1580	41.67	36.18	19.69	12.79	54.46	48.97	32.48	65.56	55.56	-16.59	-23.08	P
2	0.1980	37.35	30.69	14.16	12.86	50.21	43.55	27.02	63.69	53.69	-20.14	-26.67	P
3	0.5220	30.55	27.01	20.41	13.76	44.31	40.77	34.17	56.00	46.00	-15.23	-11.83	P
4	0.5780	29.73	27.88	22.04	13.80	43.53	41.68	35.84	56.00	46.00	-14.32	-10.16	P
5	0.9820	28.40	25.35	20.08	13.81	42.21	39.16	33.89	56.00	46.00	-16.84	-12.11	P
6	3.0460	28.08	21.57	15.26	13.25	41.33	34.82	28.51	56.00	46.00	-21.18	-17.49	P

RESULT: PASS

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ



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FCC LINE CONDUCTED EMISSION TEST SETUP



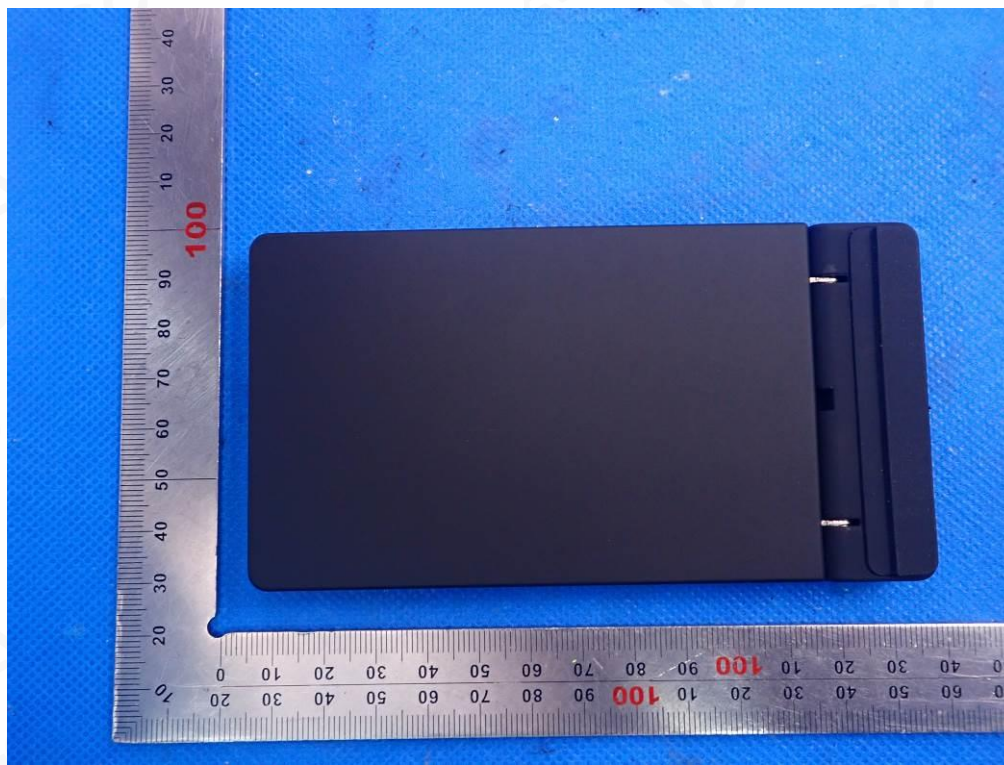
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APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



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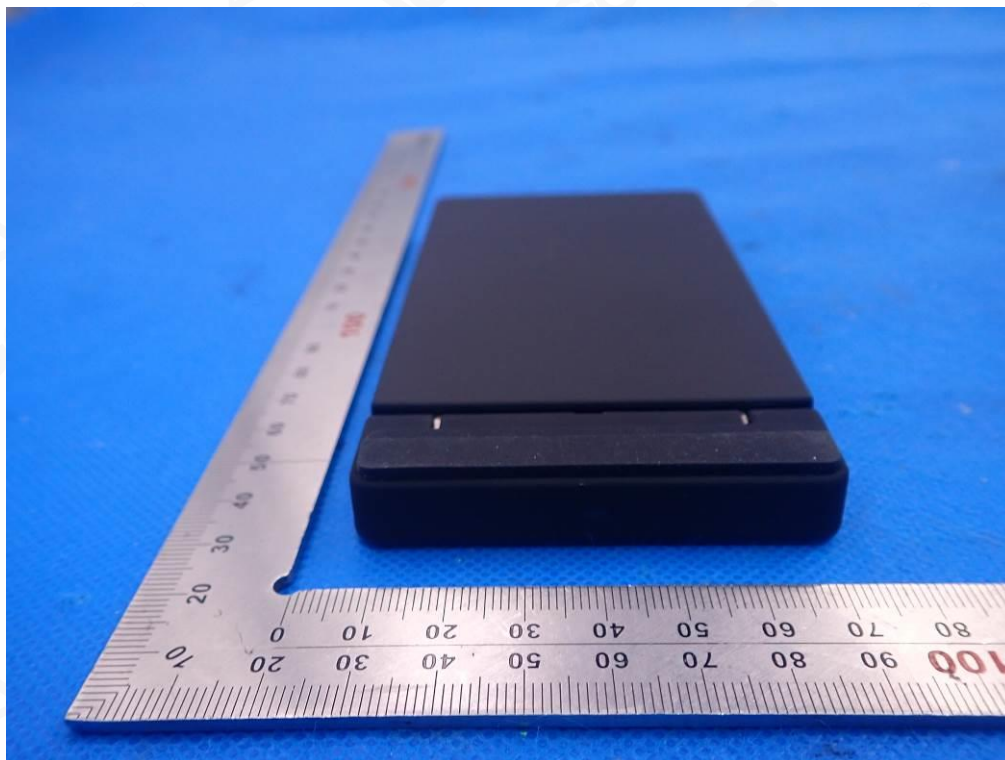
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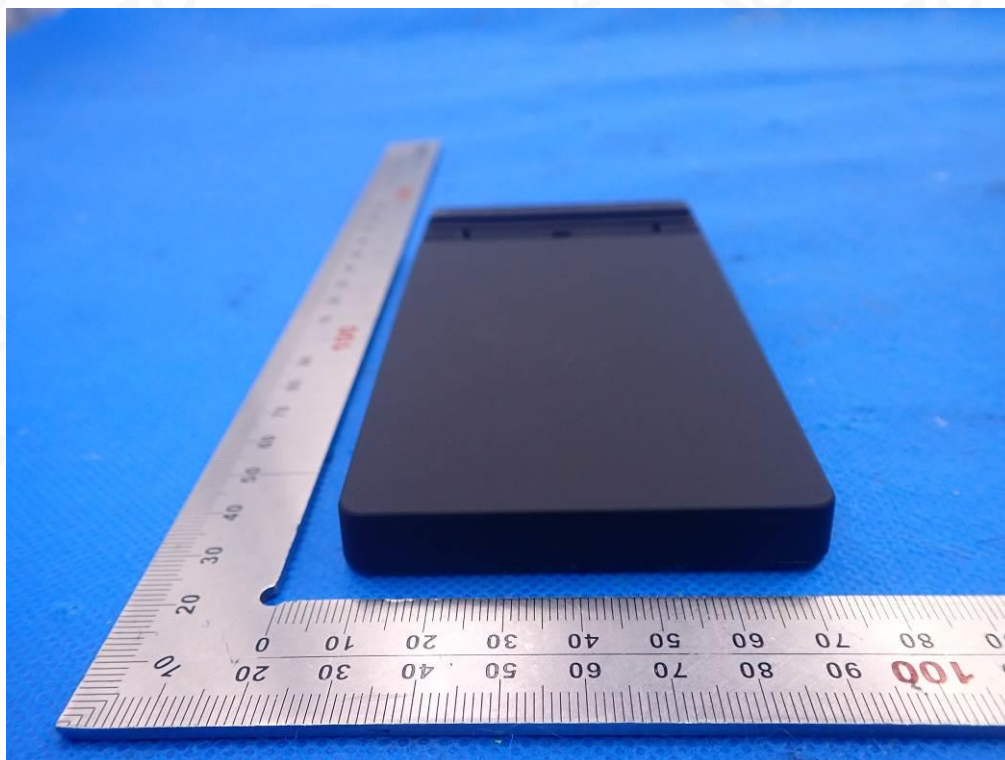
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FRONT VIEW OF EUT



BACK VIEW OF EUT

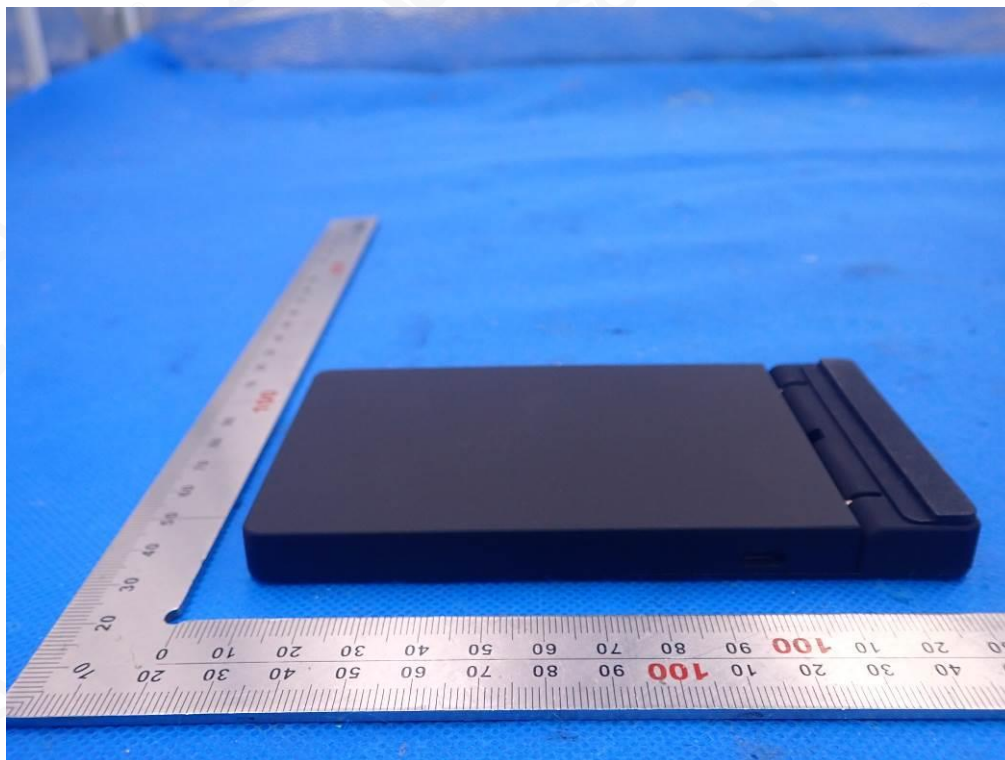


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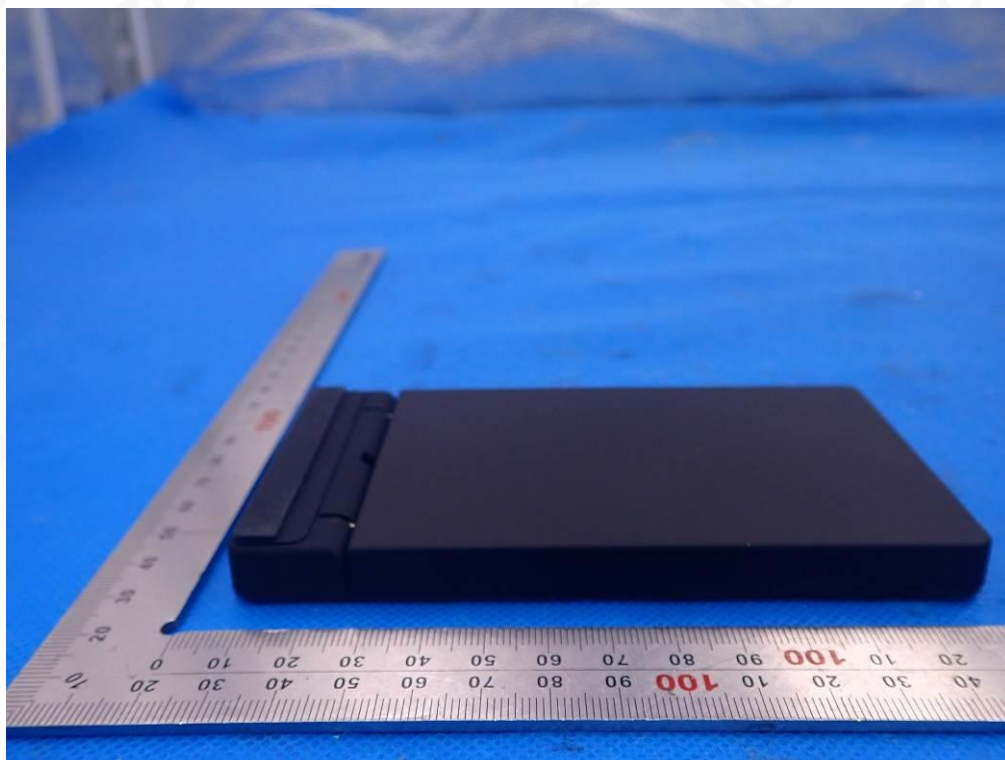
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LEFT VIEW OF EUT



RIGHT VIEW OF EUT



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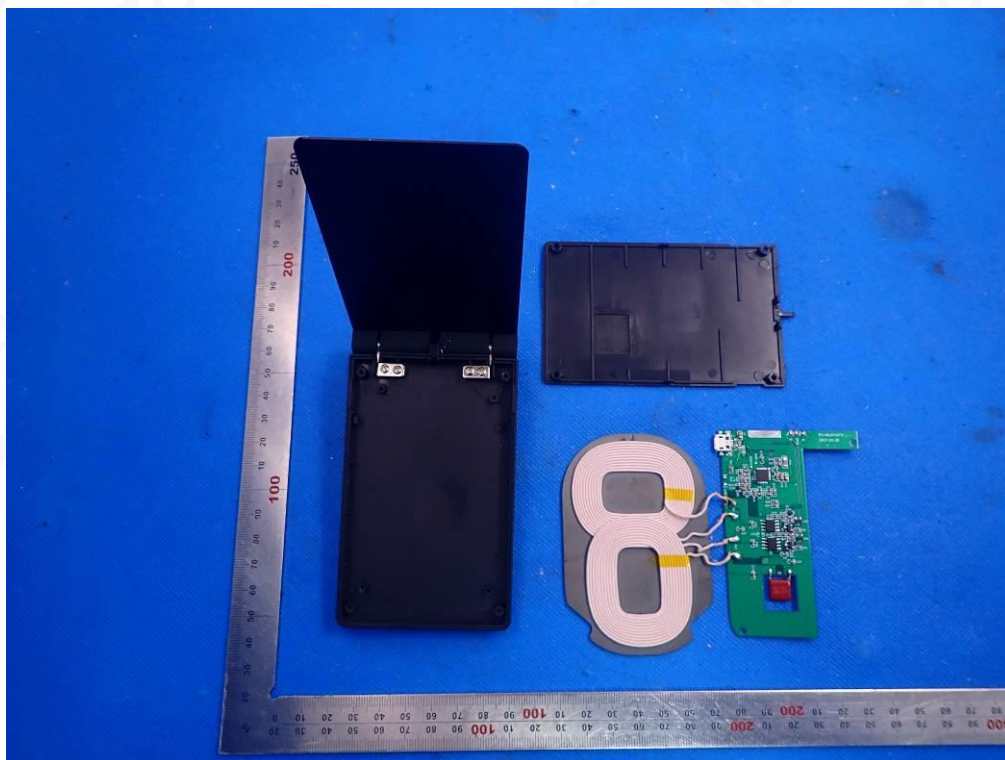
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PORT VIEW OF EUT



OPEN VIEW OF EUT

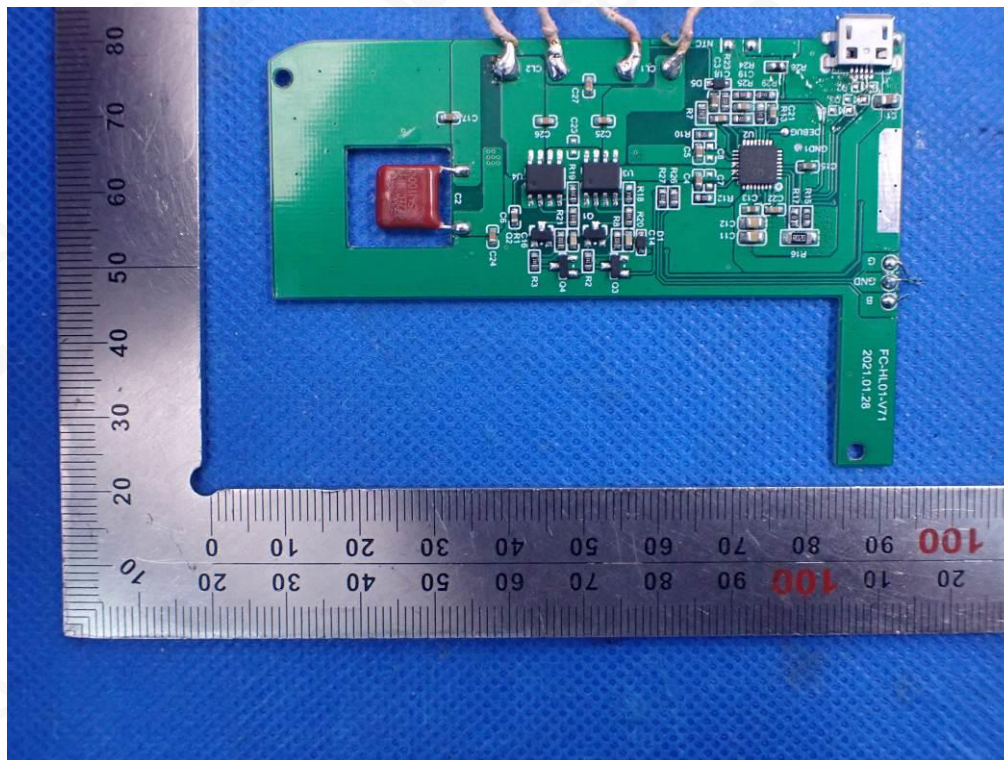


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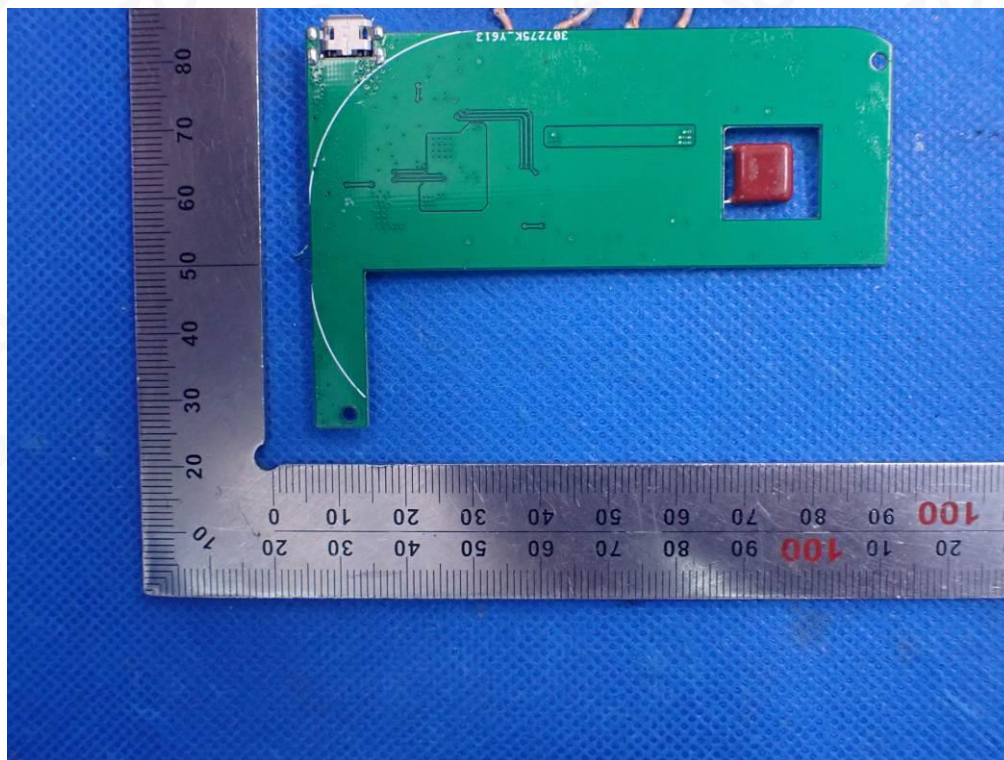
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INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2

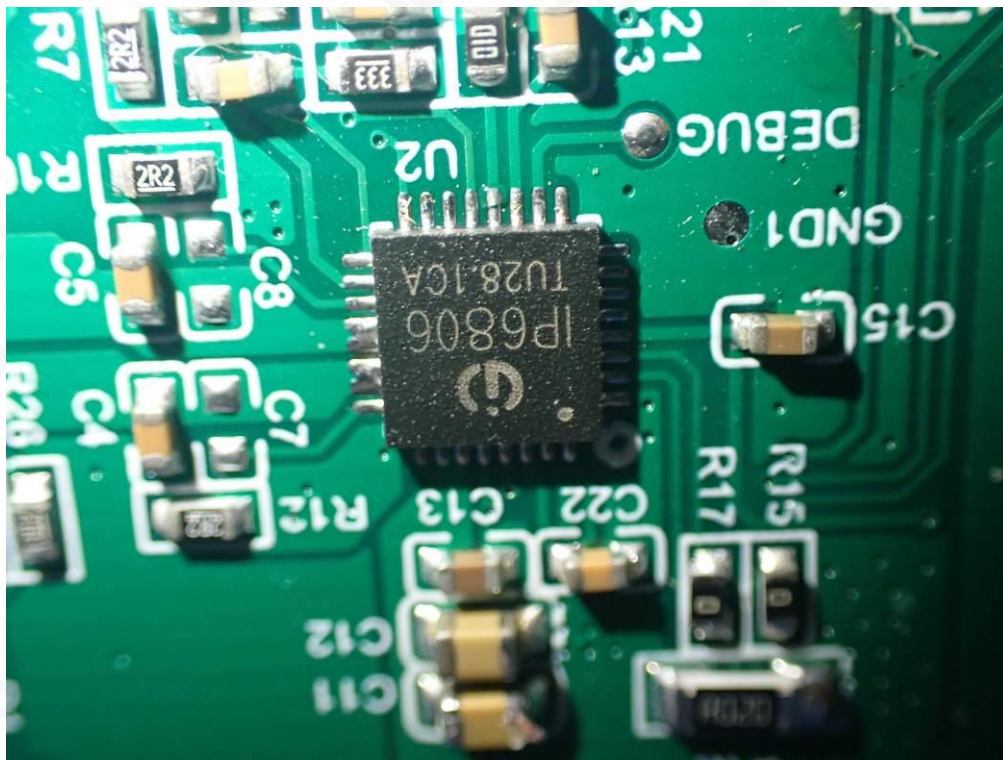


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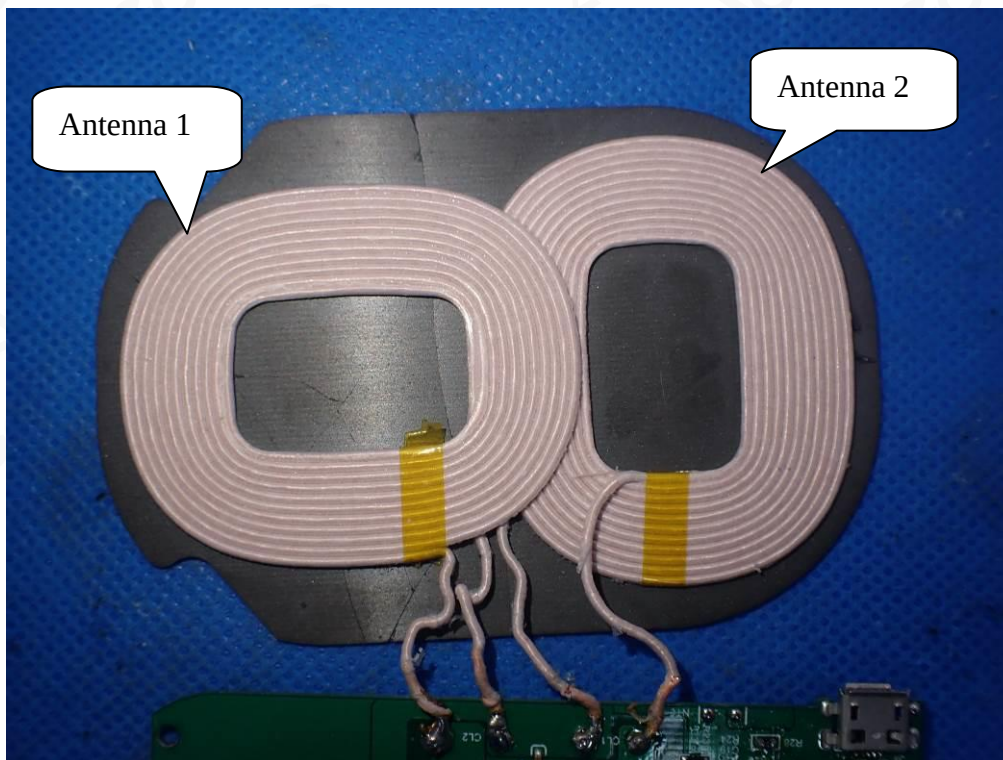
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INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



----END OF REPORT----

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3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.
5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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